**Table S1 |** Main site characteristics, climatic indexes, and studied periods of flux sites used in this analysis. All sites included are from the Tier 1 dataset, obtained from [www.fluxdata.org](http://www.fluxdata.org).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Site name** | **Veg1** | **Lat2** | **Lon3** | **Clim4** | **Period** | **Ref5** |
| AR-SLu | MF | -33.4648 | -66.4598 | Unk | 2009-2011 | [Ulke et al., 2015] |
| AR-Vir | ENF | -28.2395 | -56.1886 | Unk | 2009-2012 | [Posse et al., 2016] |
| AT-Neu | GRA | 47.1167 | 11.3175 | Unk | 2002-2012 | [Wohlfahrt et al., 2008] |
| AU-Ade | WSA | -13.0769 | 131.1178 | Unk | 2007-2009 | [Beringer et al., 2011a] |
| AU-ASM | ENF | -22.2830 | 133.2490 | Unk | 2010-2013 | [Cleverly et al., 2013] |
| AU-Cpr | SAV | -34.0021 | 140.5891 | Unk | 2010-2014 | [Meyer et al., 2015] |
| AU-Cum | EBF | -33.6133 | 150.7225 | Unk | 2012-2014 | [Beringer et al., 2016a] |
| AU-DaP | GRA | -14.0633 | 131.3181 | Aw | 2007-2013 | [Beringer et al., 2011b] |
| AU-DaS | SAV | -14.1593 | 131.3881 | Aw | 2008-2014 | [Hutley et al., 2011] |
| AU-Dry | SAV | -15.2588 | 132.3706 | Unk | 2008-2014 | [Cernusak et al., 2011] |
| AU-Emr | GRA | -23.8587 | 148.4746 | Unk | 2011-2013 | [Schroder et al., 2014] |
| AU-Fog | WET | -12.5452 | 131.3072 | Aw | 2006-2008 | [Beringer et al., 2013] |
| AU-Gin | WSA | -31.3764 | 115.7138 | Unk | 2011-2014 | – |
| AU-GWW | SAV | -30.1913 | 120.6541 | Unk | 2013-2014 | – |
| AU-How | WSA | -12.4943 | 131.1523 | Aw | 2001-2014 | [BERINGER et al., 2007] |
| AU-Lox | DBF | -34.4704 | 140.6551 | Unk | 2008-2009 | [Stevens et al., 2011] |
| AU-RDF | WSA | -14.5636 | 132.4776 | Unk | 2011-2013 | [Bristow et al., 2016] |
| AU-Rig | GRA | -36.6499 | 145.5759 | Unk | 2011-2014 | [Beringer et al., 2016b] |
| AU-Rob | EBF | -17.1175 | 145.6301 | Unk | 2014-2014 | [Beringer et al., 2016c] |
| AU-Stp | GRA | -17.1507 | 133.3502 | Unk | 2008-2014 | [Beringer et al., 2011c] |
| AU-TTE | OSH | -22.2870 | 133.6400 | Unk | 2012-2013 | – |
| AU-Tum | EBF | -35.6566 | 148.1517 | Cfb | 2001-2014 | [Leuning et al., 2005] |
| AU-Wac | EBF | -37.4259 | 145.1878 | Cfb | 2005-2008 | [Kilinc et al., 2013] |
| AU-Whr | EBF | -36.6732 | 145.0294 | Unk | 2011-2014 | [McHugh et al., 2017] |
| AU-Wom | EBF | -37.4222 | 144.0944 | Unk | 2010-2012 | – |
| AU-Ync | GRA | -34.9893 | 146.2907 | Unk | 2012-2014 | [Yee et al., 2015] |
| BE-Bra | MF | 51.3092 | 4.5206 | Unk | 1996-2014 | [Carrara et al., 2004] |
| BE-Lon | CRO | 50.5516 | 4.7461 | Cfb | 2004-2014 | [Moureaux et al., 2006] |
| BE-Vie | MF | 50.3051 | 5.9981 | Cfb | 1996-2014 | [Aubinet et al., 2001] |
| BR-Sa3 | EBF | -3.0180 | -54.9714 | Am | 2000-2004 | [Wick et al., 2005] |
| CA-Man | ENF | 55.8796 | -98.4808 | Dfc | 1994-2008 | [DUNN et al., 2007] |
| CA-NS1 | ENF | 55.8792 | -98.4839 | Dfc | 2001-2005 | [GOULDEN et al., 2006a] |
| CA-NS2 | ENF | 55.9058 | -98.5247 | Dfc | 2001-2005 | [GOULDEN et al., 2006b] |
| CA-NS3 | ENF | 55.9117 | -98.3822 | Dfc | 2001-2005 | [GOULDEN et al., 2006c] |
| CA-NS4 | ENF | 55.9144 | -98.3806 | Dfc | 2002-2005 | [GOULDEN et al., 2006d] |
| CA-NS5 | ENF | 55.8631 | -98.4850 | Dfc | 2001-2005 | [GOULDEN et al., 2006e] |
| CA-NS6 | OSH | 55.9167 | -98.9644 | Dfc | 2001-2005 | [GOULDEN et al., 2006f] |
| CA-NS7 | OSH | 56.6358 | -99.9483 | Dfc | 2002-2005 | [GOULDEN et al., 2006g] |
| CA-Qfo | ENF | 49.6925 | -74.3421 | Dfc | 2003-2010 | [BERGERON et al., 2007] |
| CA-SF1 | ENF | 54.4850 | -105.8176 | Dfc | 2003-2006 | [Mkhabela et al., 2009a] |
| CA-SF2 | ENF | 54.2539 | -105.8775 | Dfc | 2001-2005 | [Mkhabela et al., 2009b] |
| CA-SF3 | OSH | 54.0916 | -106.0053 | Dfc | 2001-2006 | [Mkhabela et al., 2009c] |
| CH-Cha | GRA | 47.2102 | 8.4104 | Unk | 2005-2014 | [Merbold et al., 2014] |
| CH-Dav | ENF | 46.8153 | 9.8559 | Unk | 1997-2014 | [Zielis et al., 2014] |
| CH-Fru | GRA | 47.1158 | 8.5378 | Unk | 2005-2014 | [Imer et al., 2013] |
| CH-Lae | MF | 47.4781 | 8.3650 | Unk | 2004-2014 | [Etzold et al., 2011] |
| CH-Oe1 | GRA | 47.2858 | 7.7319 | Unk | 2002-2008 | [Ammann et al., 2009] |
| CH-Oe2 | CRO | 47.2863 | 7.7343 | Unk | 2004-2014 | [Dietiker et al., 2010] |
| CN-Cha | MF | 42.4025 | 128.0958 | Dwb | 2003-2005 | [Guan et al., 2006] |
| CN-Cng | GRA | 44.5934 | 123.5092 | Unk | 2007-2010 | – |
| CN-Dan | GRA | 30.4978 | 91.0664 | ET | 2004-2005 | [Shi et al., 2006] |
| CN-Din | EBF | 23.1733 | 112.5361 | Cfa | 2003-2005 | – |
| CN-Du2 | GRA | 42.0467 | 116.2836 | Dwb | 2006-2008 | [Chen et al., 2009] |
| CN-Ha2 | WET | 37.6086 | 101.3269 | Unk | 2003-2005 | – |
| CN-HaM | GRA | 37.3700 | 101.1800 | ET | 2002-2004 | [KATO et al., 2006] |
| CN-Qia | ENF | 26.7414 | 115.0581 | Cfa | 2003-2005 | – |
| CN-Sw2 | GRA | 41.7902 | 111.8971 | Unk | 2010-2012 | – |
| CZ-BK1 | ENF | 49.5021 | 18.5369 | Unk | 2004-2008 | [Acosta et al., 2013] |
| CZ-BK2 | GRA | 49.4944 | 18.5429 | Unk | 2004-2006 | – |
| CZ-wet | WET | 49.0247 | 14.7704 | Unk | 2006-2014 | [Dušek et al., 2012] |
| DE-Akm | WET | 53.8662 | 13.6834 | Cfb | 2009-2014 | – |
| DE-Geb | CRO | 51.1001 | 10.9143 | Unk | 2001-2014 | [Anthoni et al., 2004] |
| DE-Gri | GRA | 50.9500 | 13.5126 | Cfb | 2004-2014 | [Prescher et al., 2010a] |
| DE-Hai | DBF | 51.0792 | 10.4530 | Unk | 2000-2012 | [Knohl et al., 2003] |
| DE-Kli | CRO | 50.8931 | 13.5224 | Cfb | 2004-2014 | [Prescher et al., 2010b] |
| DE-Lkb | ENF | 49.0996 | 13.3047 | Unk | 2009-2013 | [Lindauer et al., 2014] |
| DE-Obe | ENF | 50.7867 | 13.7213 | Cfb | 2008-2014 | – |
| DE-RuR | GRA | 50.6219 | 6.3041 | Unk | 2011-2014 | [Post et al., 2015] |
| DE-RuS | CRO | 50.8659 | 6.4472 | Cfb | 2011-2014 | [Mauder et al., 2013] |
| DE-Seh | CRO | 50.8706 | 6.4497 | Unk | 2007-2010 | [Schmidt et al., 2012] |
| DE-SfN | WET | 47.8064 | 11.3275 | Unk | 2012-2014 | [Hommeltenberg et al., 2014] |
| DE-Spw | WET | 51.8923 | 14.0337 | Cfb | 2010-2014 | – |
| DE-Tha | ENF | 50.9624 | 13.5652 | Cfb | 1996-2014 | [Grünwald and Bernhofer, 2007] |
| DK-Fou | CRO | 56.4842 | 9.5872 | Unk | 2005-2005 | – |
| DK-NuF | WET | 64.1308 | -51.3861 | ET | 2008-2014 | [Westergaard-Nielsen et al., 2013] |
| DK-Sor | DBF | 55.4859 | 11.6446 | Unk | 1996-2014 | [Pilegaard et al., 2011] |
| DK-ZaF | WET | 74.4814 | -20.5545 | ET | 2008-2011 | [Stiegler et al., 2016] |
| DK-ZaH | GRA | 74.4732 | -20.5503 | ET | 2000-2014 | [Lund et al., 2012] |
| ES-LgS | OSH | 37.0979 | -2.9658 | Unk | 2007-2009 | [Reverter et al., 2010] |
| ES-Ln2 | OSH | 36.9695 | -3.4758 | Unk | 2009-2009 | – |
| FI-Hyy | ENF | 61.8474 | 24.2948 | Unk | 1996-2014 | – |
| FI-Jok | CRO | 60.8986 | 23.5135 | Unk | 2000-2003 | [Lohila, 2004] |
| FI-Lom | WET | 67.9972 | 24.2092 | Unk | 2007-2009 | – |
| FI-Sod | ENF | 67.3619 | 26.6378 | Unk | 2001-2014 | [Thum et al., 2007] |
| FR-Fon | DBF | 48.4764 | 2.7801 | Cfb | 2005-2014 | [Delpierre et al., 2015] |
| FR-Gri | CRO | 48.8442 | 1.9519 | Cfb | 2004-2013 | [Loubet et al., 2011] |
| FR-LBr | ENF | 44.7171 | -0.7693 | Unk | 1996-2008 | [Berbigier et al., 2001] |
| FR-Pue | EBF | 43.7414 | 3.5958 | Unk | 2000-2014 | [Rambal et al., 2004] |
| GF-Guy | EBF | 5.2788 | -52.9249 | Unk | 2004-2014 | [BONAL et al., 2008] |
| IT-BCi | CRO | 40.5238 | 14.9574 | Unk | 2004-2014 | [Vitale et al., 2015] |
| IT-CA1 | DBF | 42.3804 | 12.0266 | Unk | 2011-2014 | [Sabbatini et al., 2016a] |
| IT-CA2 | CRO | 42.3772 | 12.0260 | Unk | 2011-2014 | [Sabbatini et al., 2016b] |
| IT-CA3 | DBF | 42.3800 | 12.0222 | Unk | 2011-2014 | [Sabbatini et al., 2016c] |
| IT-Col | DBF | 41.8494 | 13.5881 | Unk | 1996-2014 | [VALENTINI et al., 1996] |
| IT-Cp2 | EBF | 41.7043 | 12.3573 | Unk | 2012-2014 | [Fares et al., 2014] |
| IT-Cpz | EBF | 41.7052 | 12.3761 | Unk | 1997-2009 | [GARBULSKY et al., 2008] |
| IT-Isp | DBF | 45.8126 | 8.6336 | Unk | 2013-2014 | [Ferréa et al., 2012] |
| IT-La2 | ENF | 45.9542 | 11.2853 | Unk | 2000-2002 | [Marcolla et al., 2003a] |
| IT-Lav | ENF | 45.9562 | 11.2813 | Unk | 2003-2014 | [Marcolla et al., 2003b] |
| IT-MBo | GRA | 46.0147 | 11.0458 | Unk | 2003-2013 | [Marcolla et al., 2011] |
| IT-Noe | CSH | 40.6061 | 8.1515 | Unk | 2004-2014 | [Papale et al., 2014] |
| IT-PT1 | DBF | 45.2009 | 9.0610 | Unk | 2002-2004 | [Migliavacca et al., 2009] |
| IT-Ren | ENF | 46.5869 | 11.4337 | Unk | 1998-2013 | [Montagnani et al., 2009] |
| IT-Ro1 | DBF | 42.4081 | 11.9300 | Unk | 2000-2008 | [Rey et al., 2002] |
| IT-Ro2 | DBF | 42.3903 | 11.9209 | Unk | 2002-2012 | [TEDESCHI et al., 2006] |
| IT-SR2 | ENF | 43.7320 | 10.2910 | Unk | 2013-2014 | – |
| IT-SRo | ENF | 43.7279 | 10.2844 | Unk | 1999-2012 | [Chiesi et al., 2005] |
| IT-Tor | GRA | 45.8444 | 7.5781 | Unk | 2008-2014 | [Galvagno et al., 2013] |
| JP-MBF | DBF | 44.3869 | 142.3186 | Unk | 2003-2005 | [Matsumoto et al., 2008a] |
| JP-SMF | MF | 35.2617 | 137.0788 | Unk | 2002-2006 | [Matsumoto et al., 2008b] |
| NL-Hor | GRA | 52.2404 | 5.0713 | Unk | 2004-2011 | [Jacobs et al., 2007] |
| NL-Loo | ENF | 52.1666 | 5.7436 | Unk | 1996-2013 | – |
| NO-Adv | WET | 78.1860 | 15.9230 | Unk | 2011-2014 | – |
| NO-Blv | SNO | 78.9216 | 11.8311 | Unk | 2008-2009 | [Lüers et al., 2014] |
| RU-Che | WET | 68.6130 | 161.3414 | Unk | 2002-2005 | [MERBOLD et al., 2009] |
| RU-Cok | OSH | 70.8291 | 147.4943 | Unk | 2003-2014 | [van  der Molen et al., 2007] |
| RU-Fyo | ENF | 56.4615 | 32.9221 | Unk | 1998-2014 | [Kurbatova et al., 2008] |
| RU-Ha1 | GRA | 54.7252 | 90.0022 | Dfc | 2002-2004 | [Marchesini et al., 2007] |
| SD-Dem | SAV | 13.2829 | 30.4783 | Unk | 2005-2009 | [Ardo et al., 2008] |
| SN-Dhr | SAV | 15.4028 | -15.4322 | Unk | 2010-2013 | [Tagesson et al., 2014] |
| US-AR1 | GRA | 36.4267 | -99.4200 | Dsa | 2009-2012 | [Raz-Yaseef et al., 2015a] |
| US-AR2 | GRA | 36.6358 | -99.5975 | Dsa | 2009-2012 | [Raz-Yaseef et al., 2015b] |
| US-ARb | GRA | 35.5497 | -98.0402 | Cfa | 2005-2006 | [Raz-Yaseef et al., 2015c] |
| US-ARc | GRA | 35.5465 | -98.0400 | Cfa | 2005-2006 | [Raz-Yaseef et al., 2015d] |
| US-ARM | CRO | 36.6058 | -97.4888 | Cfa | 2003-2012 | [Fischer et al., 2007] |
| US-Blo | ENF | 38.8953 | -120.6328 | Csa | 1997-2007 | [Goldstein et al., 2000] |
| US-Cop | GRA | 38.0900 | -109.3900 | Unk | 2001-2007 | [Bowling et al., 2010] |
| US-GBT | ENF | 41.3658 | -106.2397 | Dfc | 1999-2006 | [Zeller and Nikolov, 2000] |
| US-GLE | ENF | 41.3665 | -106.2399 | Dfc | 2004-2014 | [Frank et al., 2014] |
| US-Ha1 | DBF | 42.5378 | -72.1715 | Dfb | 1991-2012 | [Urbanski et al., 2007] |
| US-KS2 | CSH | 28.6086 | -80.6715 | Cwa | 2003-2006 | [Powell et al., 2006] |
| US-Los | WET | 46.0827 | -89.9792 | Dfb | 2000-2014 | [Sulman et al., 2009] |
| US-Me1 | ENF | 44.5794 | -121.5000 | Csb | 2004-2005 | [IRVINE et al., 2007] |
| US-Me2 | ENF | 44.4523 | -121.5574 | Csb | 2002-2014 | [IRVINE et al., 2008] |
| US-Me6 | ENF | 44.3233 | -121.6078 | Csb | 2010-2014 | [Ruehr et al., 2012] |
| US-MMS | DBF | 39.3232 | -86.4131 | Cfa | 1999-2014 | [DRAGONI et al., 2011] |
| US-Myb | WET | 38.0498 | -121.7651 | Csa | 2010-2014 | [Matthes et al., 2014] |
| US-Ne1 | CRO | 41.1651 | -96.4766 | Dfa | 2001-2013 | [Verma et al., 2005a] |
| US-Ne2 | CRO | 41.1649 | -96.4701 | Dfa | 2001-2013 | [Verma et al., 2005b] |
| US-Ne3 | CRO | 41.1797 | -96.4397 | Dfa | 2001-2013 | [Verma et al., 2005c] |
| US-NR1 | ENF | 40.0329 | -105.5464 | Dfc | 1998-2014 | [Monson et al., 2002] |
| US-ORv | WET | 40.0201 | -83.0183 | Cfa | 2011-2011 | [Morin et al., 2014] |
| US-PFa | MF | 45.9459 | -90.2723 | Dfb | 1995-2014 | [Desai et al., 2015] |
| US-Prr | ENF | 65.1237 | -147.4876 | Dwc | 2010-2013 | [Nakai et al., 2013] |
| US-SRG | GRA | 31.7894 | -110.8277 | Bsk | 2008-2014 | [Scott et al., 2015a] |
| US-SRM | WSA | 31.8214 | -110.8661 | Bsk | 2004-2014 | [Scott et al., 2009] |
| US-Syv | MF | 46.2420 | -89.3477 | Dfb | 2001-2014 | [Desai et al., 2005] |
| US-Ton | WSA | 38.4316 | -120.9660 | Csa | 2001-2014 | [Baldocchi et al., 2010] |
| US-Tw1 | WET | 38.1074 | -121.6469 | Csa | 2012-2014 | [Oikawa et al., 2017] |
| US-Tw2 | CRO | 38.1047 | -121.6433 | Csa | 2012-2013 | [Knox et al., 2016] |
| US-Tw3 | CRO | 38.1159 | -121.6467 | Csa | 2013-2014 | [Baldocchi et al., 2015] |
| US-Tw4 | WET | 38.1030 | -121.6414 | Csa | 2013-2014 | [Baldocchi, 2016] |
| US-Twt | CRO | 38.1087 | -121.6530 | Csa | 2009-2014 | [Hatala et al., 2012] |
| US-UMB | DBF | 45.5598 | -84.7138 | Dfb | 2000-2014 | [Gough et al., 2013a] |
| US-UMd | DBF | 45.5625 | -84.6975 | Dfb | 2007-2014 | [Gough et al., 2013b] |
| US-Var | GRA | 38.4133 | -120.9507 | Csa | 2000-2014 | [Ma et al., 2007] |
| US-WCr | DBF | 45.8059 | -90.0799 | Dfb | 1999-2014 | [Cook et al., 2004] |
| US-Whs | OSH | 31.7438 | -110.0522 | Bsk | 2007-2014 | [Scott et al., 2015b] |
| US-Wi0 | ENF | 46.6188 | -91.0814 | Dfb | 2002-2002 | [Noormets et al., 2007a] |
| US-Wi3 | DBF | 46.6347 | -91.0987 | Dfb | 2002-2004 | [Noormets et al., 2007b] |
| US-Wi4 | ENF | 46.7393 | -91.1663 | Dfb | 2002-2005 | [Noormets et al., 2007c] |
| US-Wi6 | OSH | 46.6249 | -91.2982 | Dfb | 2002-2003 | [Noormets et al., 2007d] |
| US-Wi9 | ENF | 46.6188 | -91.0814 | Dfb | 2004-2005 | [Noormets et al., 2007e] |
| US-Wkg | GRA | 31.7365 | -109.9419 | Bsk | 2004-2014 | [Scott et al., 2010] |
| ZA-Kru | SAV | -25.0197 | 31.4969 | Unk | 2000-2010 | [Archibald et al., 2009] |
| ZM-Mon | DBF | -15.4378 | 23.2528 | Unk | 2000-2009 | [Merbold et al., 2009] |

1Vegetation types: deciduous broadleaf forest (DBF); evergreen broadleaf forest (EBF); evergreen needleleaf forest (ENF); grassland (GRA); mixed deciduous and evergreen needleleaf forest (MF); savanna ecosystem (SAV); shrub ecosystem (SHR); wetland (WET); unknown (UNK). 2Positive value indicates north latitude. 3Negative value indicates west longitude. 4Köppen Climate classification. 5References.

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